

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

CONTROLLED DRAINAGE

(acre)
CODE 335

DEFINITION

Control of surface and subsurface water through use of drainage facilities and water control structures.

The presence of a slowly permeable underlying soil layer is needed to prevent excessive deep seepage losses during periods when a raised water table is desired.

Scope

This standard applies to management of surface or subsurface outflow from drainage facilities. This standard does not apply to water management systems that are planned to provide sub-irrigation water supply which is covered by Water Table Control (641).

3. Soil aeration is needed in addition to controlling ground water and surface runoff.
4. Saline or sodic soil conditions can be maintained at an acceptable level for efficient production of crops.
5. Improvement of onsite or offsite water quality is desired and may be provided by controlling drainage outflow.
6. Improvement of water quality can be achieved through management of water for maximum denitrification.

PURPOSES

To conserve water and maintain optimum soil moisture to:

1. Store and manage infiltrated rainfall for more efficient crop production.
2. Improve surface water quality by increasing infiltration thereby reducing runoff that may carry sediment and undesirable chemicals.
3. Reduce nitrates in the drainage water by enhancing conditions for denitrification.
4. Reduce subsidence and wind erosion of organic soils.
5. Hold water in channels in forest areas to act as ground fire breaks.
6. Provide water for wildlife and a resting and feeding place for waterfowl.

CRITERIA

General

Designs are to be in accordance with other pertinent Practice Standards such as Structure for Water Control (587); Subsurface Drain (606); Surface Drainage, Field Ditch (607); Surface Drainage, Main or Lateral (608); and the following additional criteria:

Capacity

Facilities are to be designed so that all component parts shall have the capacity to remove the flow of water required for designed drainage. The combined capacity of the surface and subsurface facilities shall satisfy the appropriate drainage coefficient for the crops to be grown.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies primarily to cropland where:

1. The topography is relatively uniform, and flat to gently sloping.
2. Subsurface conditions are such that a water table can be maintained without excessive water loss.

Structure for Water Control

Structures for water control shall be installed wherever necessary and field surfaces graded and smoothed to ensure that moisture from the controlled water table is available to the crop. Structures shall be sized such that design flows over the flashboard or through the

control structure can be maintained with a maximum head of 0.5 feet during normal operation. Structures shall be designed so that the control can be removed to return to the drainage mode when desired. Water tables should be dropped slowly to prevent high exit gradients that may draw sediment or other pollutants into the drains. Ease of management and operation of the control structures shall be considered. Automatic devices should be considered to lower the flashboard or control the position of the outlet structure during sudden or high peak flows following infrequent storms. Pumping may be needed to achieve the objective in some sites. Refer to Pumping Plant for Water Control (533).

CONSIDERATIONS

1. Consider the effects on wetlands.
2. Evaluate the effects of variations in the water budget either above or below the point of control.
3. Consider effects of change in the flow of downstream watercourses.
4. Consider the effects of change in the water table.
5. Consider effects of outflow on erosion in downstream watercourses.
6. Evaluate the effects of possible change in the delivery of sediment and sediment-attached substances.
7. Consider the potential for changes in dissolved chemical loading from nitrates and other salts including managing denitrification.
8. Consider changes in salinity and other dissolved chemicals in soils and ground water and surface waters.
9. Consider effects on downstream water temperatures.
10. Consider the effects of the planned drainage outflow on the visual quality of discharge or downstream water.

Water Quantity

1. Effects on the water budget.
2. Effects on baseflow and runoff to water uses and users.

3. Effects on ground water recharge.
4. The volume of soil water needed to improve plant growth.

Water Quality

1. Effects on the delivery of sediment and dissolved and sediment-attached substances.
2. Effect of changes in the delivery of dissolved salts, such as nitrates, on downstream water uses and users.
3. In areas of ground water recharge, changes in the delivery of dissolved substances to the aquifer.
4. Effect on downstream water temperatures.
5. Effects on the visual quality of downstream water

Endangered Species Considerations

Determine if installation of this practice with any others proposed will have any effect on any federal or state listed Rare, Threatened or Endangered species or their habitat. NRCS's objective is to benefit these species and others of concern or at least not have any adverse effect on a listed species. If the Environmental Evaluation indicates the action may adversely affect a listed species or result in adverse modification of habitat of listed species which has been determined to be critical habitat, NRCS will advise the land user of the requirements of the Endangered Species Act and recommend alternative conservation treatments that avoid the adverse effects. Further assistance will be provided only if the landowner selects one of the alternative conservation treatments for installation; or at the request of the landowners, NRCS may initiate consultation with the Fish and Wildlife Service, National Marine Fisheries Service and/or California Department of Fish and Game. If the Environmental Evaluation indicates the action will not affect a listed species or result in adverse modification of critical habitat, consultation generally will not apply and usually would not be initiated. Document any special considerations for endangered species in the Practice Requirements Worksheet.

PLANS AND SPECIFICATIONS

Plans and specifications for controlled drainage shall be in keeping with this standard and shall describe the

requirements for property installing and operating the practice.

OPERATION AND MAINTENANCE

A plan of operation shall be prepared for the system to ensure that the system objectives are met. The plan of operation should address the following objectives as applicable:

1. During rainfall, if the water table rises significantly, the outlet controls should be lowered or the system put into a drainage mode.
2. Prior to tillage and planting operations, the water table should be at a depth to provide trafficability with capillary water available when needed.
3. Immediately after planting, the water table control device should be set to allow infiltration from rainfall to bring the water table up to the desired water level to provide capillary water in the root zone.
4. Water table management during wet periods is important because crops may be damaged if the water table is held too near the surface and if drainage is not provided when needed.
5. The system should be operated so that the water table is at a depth sufficient to ensure trafficability prior to harvest.